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This report consists of three parts--(1) an overview of the use of the Ampex Intrinsic Device (AID) in beginning Spanish classes, (2) a description of the Course Author Language (CAL) computer program, and (3) a description of a supplementary project for the testing of the Appleton-Century-Crofts-Center for Applied Linguistics French Program. The workings of the AID machine are explained and the results of two quarters of its use are discussed. A great deal of additional information about AID, including statistical results, a sample module, and notes on program preparation, program recording, coding, and budget is presented. The CAL program's development and possible uses are described with special reference to problem areas, and to possible ties with AID. Presentation of the French program and recommendations for its use are considered. (AF)

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FINAL REPORT

University of California, Irvine

INNOVATIVE PROJECTS --- Foreign Language Teaching

June 1969

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Innovative Project in Foreign Language Teaching

An Overview

We live in an age where scientific and technological discovery has begun to outdistance other areas such as the humanities, social sciences, education, etc. One effort to help close the gap can now be found at the University of California, Irvine. The work being done is in the innovative project headed by Dr. Richard Barrutia and is related to the teaching of Spanish by means of a special tape-recorder. This specialized instructional device was designed so as to be able to facilitate the features of linear and branched programmed instruction and yet be portable, and relatively low in cost. The machine which was developed and built by Ampex Corporation is called AID (Ampex Intrinsic Device) and since Fall of 1968 has been providing Spanish instruction to beginning students at UCI.

Perhaps it would be appropriate to further explain the AID machine and then discuss its effectiveness. The basic unit provides audio instruction with branching features which allows for testing of the student's progress. Depending on his performance, he is allowed to continue, given extra material, or corrected with remedial material. Although linear programming is possible, the basic and most important feature is the branched programming which allows the student to progress at his own rate of speed. Therefore the quick learner will spend little time in the branches while the slow learner will spend more time with extra and remedial material. Also the quick learner is not bored by a slow pace and the slow learner does not get lost

with a fast one. A slide projector is also used which is controlled by the audio unit and provides visual materials to supplement or reinforce the audio. The advantages of these visuals in the teaching of a foreign language are especially great in that translations into the native language are kept to a minimum.

The hypothesis which guides this project is that students studying beginning Spanish with the AID machine can learn the language (hearing, speaking, reading and writing) as well as those students in the conventional teacher-taught classes. Although the final statistics are not available, nor has the project reached its end, some preliminary statistics seem to support the hypothesis.

In the first quarter of operation, four students registered for the course. (No measures were taken to screen those who registered.) After an organizational meeting, the students were on their own to work with AID. They were expected to spend five hours per week with AID and two and one half hours in the regular language laboratory. Each week they were given an oral examination. At the end of the quarter they took a standard written departmental final exam along with the control groups (students taught by teaching assistants in a regular classroom situation). In competition with 49 regular students, the four AID students scores were in the top 3% (97% or better).

In the second quarter of operation, nine students registered. However, they were allowed to attend as much as they felt necessary (although the minimum of five hours plus language lab was recommended). They were given weekly oral tests and again took the standard final with 43 control group students. Those who attended regularly scored

well (in the top 20%) while those who missed frequently (up to five weeks) scored very poorly (in the bottom 10%).

We feel that these statistics are important in that the emphasis on the final exam was in reading and writing and although the AID students learned mostly to hear and speak the language, they still did well in reading and writing. This quarter, the control group will be given oral finals to see if they can do as well as the AID students. (See the Appendix, Chart #1, for the complete statistics of the second quarter at UCI.) These final exams emphasized the need to teach reading and writing along with the hearing and speaking. Therefore, the remainder of this study is concerned with an outgrowth or branch of the AID project in the area of Computer Assisted Instruction (CAI).

Research in the computer sciences has grown to such an extent that branches can be found in such unlikely areas as humanities and foreign languages. Research is being done to determine the possiblities of programmed language instruction, machine translation, and even speech analysis and speech synthesis. Relative success has been attained in programs which aid ir the teaching of reading and writing of a language, whereas the areas of speech production are still in their infancy.

At the University of California, Irvine, we conducted computer research related to teaching the reading and writing of Spanish. Two major factors guided our research. First, we realized that language is primarily a process of hearing and speaking. Therefore our work started with AID. However, one cannot ignore the importance of reading and writing. Our phase II programs consequently were designed to follow up the audio-linguo instruction with reading and writing. Second, we adhered to the concept of branched programmed learning such as was used in the audio programs of AID. This made possible a fuller use of the computer's abilities which in turn makes such a program more feasible.

The purpose of this portion of the is to describe the inception of the computer project, trace its development, and make projections as to future possibilities.

The ideas for computer programs came as a result of the research being done by Dr. Richard Barrutia and his research team. About the

same time as we realized the need for more reading and writing, the computer facilities at UCI contacted us concerning the feasibility of utilizing the computer and a language called CAL (Course Author Language). As it turned out, CAL also provided for extensive branching. We decided to take on the challenge and try our hand at computer assisted language learning.

It would probably be convenient to describe some of the basic capabilities of CAL before explaining the development of our program.

CAL's basic feature is the possibility of virtually infinite branching. When a student makes an incorrect response he is given remedial or supplementary material to aid him before returning to program. Another important feature is that CAL allows extensive analysis and working with student responses. For example, if the response required from the student were:

Juan habló con María ayer.

and the actual student response were:

Juan hablo con María.

various programming options are available. A "match" may be used which would require that the response match the expected response letter for letter, including spaces, accents, and all other punctuation. Any deviation would result in a "switch" being set to "negative"(-). This would require, then, that other statements be executed before allowing the student to continue. Some of these "other statements" might include a "scan" which would look for predictable errors. For example, in the above sentence we may know that the student would forget the accent so we would scan for "hablo". If it is found, then a statement

such as 'No. Don't forget your accents." might be executed. This process could include basic mistakes only, or be ready to analyze the most minute detail. Another feature allows the counting of responses and correct or incorrect answers giving the student and/or the teacher a chance to check individual progress.

To begin with, we decided to adapt the workbook for Modern Spanish as the basis for our program. We used mostly pattern-response drills although we did use some item substitution and question-answer exercises. We felt that to request a multiple choice response would not utilize the computer's capacities so we required the students to write the response (usually a sentence) in full. We tried to cover as many of the predictable errors as possible and include sufficient remedial material. We also felt that no computer program need be dry nor boring, so we added humor,either in the remedials themselves, or as jokes, games, etc.

The process for the course production evolved slowly. First the writer programs the text on IBM coding forms. Then the IBM cards were punched. This provided a special problem which will be discussed later. Then the cards were run through a process called CALCHECK to check for syntax errors. Next they were entered into the computer as a course chapter. The program had to be tested before the students were finally allowed to "take the course." We encountered many problems, most of which related directly to the fact that we were working with Spanish. For example, we felt that differentiation of capital and small letters was important. This caused problems in keypunching because to punch small letters requires an extra hole which must be added after the line

is typed. We had the alternative of entering the course directly from a terminal, but this was an extremely slow and costly process. Finally members of the computer staff developed a system named CALPUNCH which allowed the typist to type the statements on a terminal, after which the computer would punch the cards. They could be checked and then be entered as a course. This proved to be very fast and most economical. For example, to enter 150 lines would normally take about 2 hours and would cost computer time plus typist. To punch the cards by conventional keypunch required much more time, but no computer cost. To type 150 lines by CALPUNCH would take only about 30 minutes and would only cost for terminal time (much less than computer time). The development of CALPUNCH was only one example of the tremendous cooperation and help we received from the UCI computer facility staff.

At first we tried to make do with the conventional IBM typewriter "ball," but it proved to be inadequate for Spanish. We finally began using an IBM Tri-lingual ball which filled our needs well. The printouts, etc., look funny, but with the correct ball at the terminal, the student copy turns out just right. (Note the difference between Chapter 08 and Chapter 09).

One problem which still exists is the accent mark. We have no trouble programming it to appear correctly before the student, but in order to have it read entirely correctly we would have to ask the student to do some strange typing. Instead we had them type it normally which left the accent and deleted the accented vowel. This caused problems in that many times both the vowels and the accent are of utmost importance. Perhaps making a "dead key" on the terminal is the answer.

Finally, we learned that it is necessary to "match" the answers before "scanning" for the parts. When we had only "scan" statements for the predictable errors, the less important areas many times were typed incorrectly, followed by "Muy bien" and allowing the student to continue. Unfortunately, the entire CAL system was proven to be too costly and was removed on April 3, 1969. However, a new language called APL was developed by Orange Coast College which provides for the same branching and checking features and which is a much faster and accurate system. We also feel that the experience we gained in this pilot experiment will enable us to produce a complete and effective computer program for the year 1969-1970.

What, then, awaits us in the future? First, we will have slightly modified equipment to work with. The Ampex Corporation has been anxious to help make AID meet the needs of education. Among the new features is included a new and more accurate program coding system which runs the audio, a random access slide projector, a motion picture projector, a paper puller and up to three other auxilliary devices. The computer facility has also been anxious to help and the APL system is an evidence of this concern.

Second, we will design a new course which will incorporate the features of our new equipment in addition to implementation of the methods of program writing which have proven most effective.

Third, the possiblities of closer AID-computer ties will be researched. This will include a correlation of the audio materials with the computer program. Other possibilities include controlling the random access slide projector and perhaps another tape recorder with computer. (See Appendix, Charts #2 and #3).

Fourth, research must be conducted related to the teaching of other subjects via AID (and optionally, the computer). Such projects which we have envisioned and would like to do include the teaching of linguistics, phonology, or literature. Other projects which could be conducted by qualified people in other fields could include other languages such as Swahili or English as a second language. Such programs could be taught via AID, thus satisfying minority groups' requests in situations where a regular teacher could not be hired. Other valuable areas of education might include teacher education, physics, chemistry, dentistry,

special education (handicapped or in-home education) plus many others.

Needless to say, the door has been opened toward better methods of education. But we must take the initiative to walk through the door and continue the research. There seems to be no reason for remaining in the "stone-age" of education when modern technology is within our reach.

Chart #1

STATISTICAL RESULTS OF THE AID PROJECT WINTER, 1969

Final Exam (Possible 200)		Weekly Exams (Oral)					Average Weekly	Final Grade
A:	188	A	A	A	A	A	A	A
	185	B	A	A	B	A	A-	A
	184 1/2	A	A	A	A	A	A	A
B:	175	B	A	A	A	A	A	A
	169	A-	B	B	B	-	B	B
C:	144 1/2	B	B	A	B-	B	B	B
F:	121	B	B	A	B	B	B	D
	118	A-	B	B	D	-	B-	D
	103 1/2	C	B	B	C	-	C	D

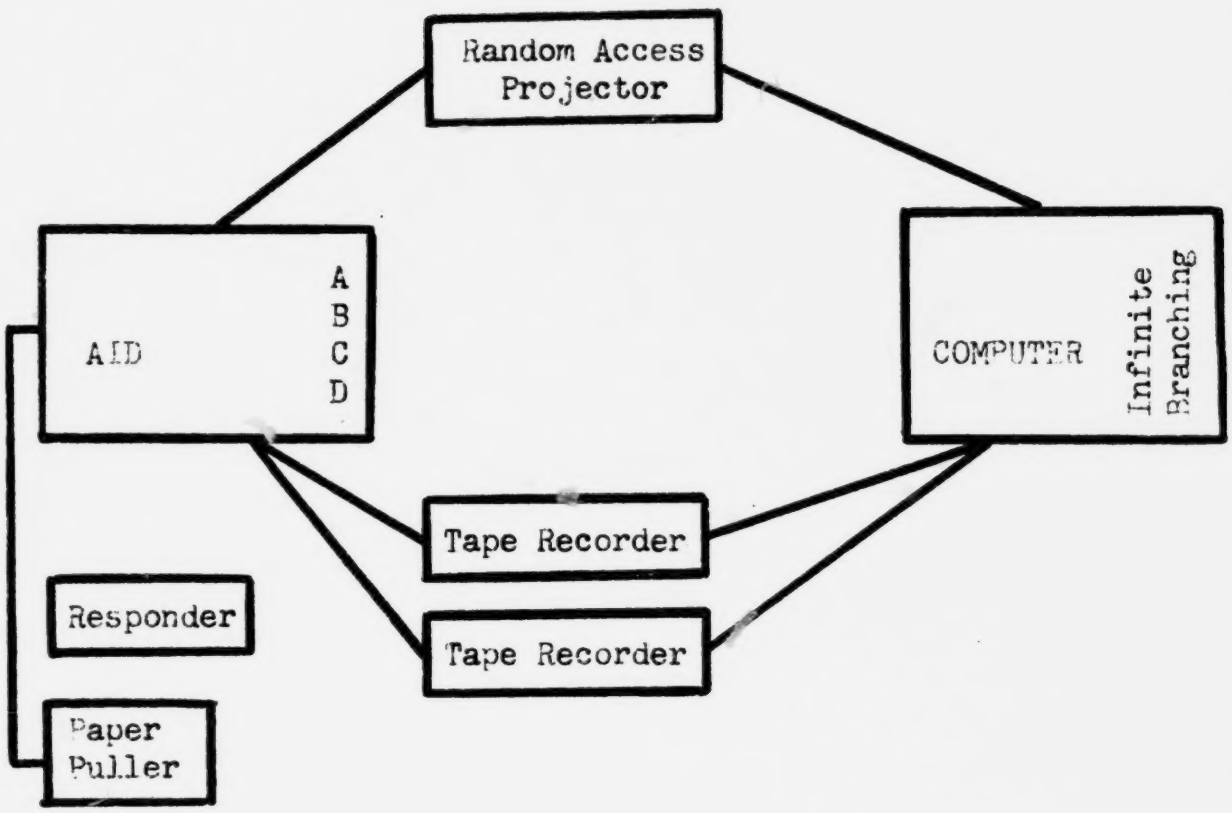
Weekly oral exams were averaged and assigned 50% weight. Final exam was weighted 50%. Borderline cases were resolved by taking into account composition, reading assignments, and attendance

Final Exam Scores of ALL Beginning Students (Possible 200)

A:	B:	C:	D:	F:
191	180	159	138	121
188 (3)	179 (2)	155	137	118
185 (3)	178 (2)	146 (2)	135	117
183	177	145	126	104
181	176	143		
	175 (2)			
	174			
	173			
	171			
	169			
	167			
	166			
	165			
	164 (3)			
	163			
	160			

Chart 2

POSSIBLE TOTAL SELF-INSTRUCTIONAL PROGRAM
FOR FOREIGN LANGUAGES



1. Main source of Audio-Lingual instruction is AID.

2. Main source of Reading-Writing instruction is the computer.

3. Additional aids:

   a. Random Access Slide Projector.

   b. Tape recorders.

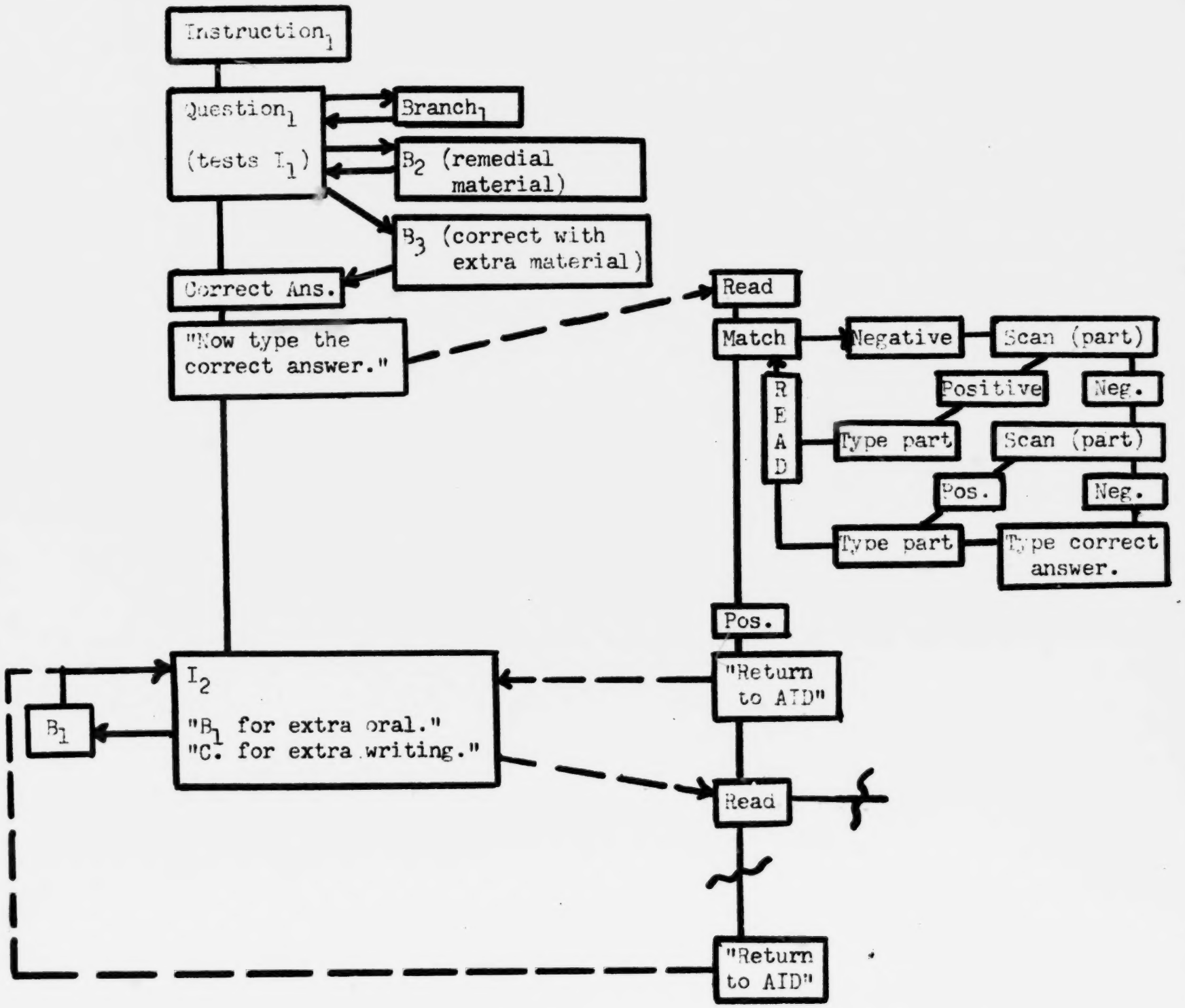
      1.) Responder.

      2.) (Two) additional units for extra audio material. (With "address" and/or "stop" features.)

   c. Paper Puller.

Chart 3

SAMPLE MODULE IN AID-COMPUTER COURSE



On Program Preparation

The written programs began on a theoretical basis, that is, we know what AID was supposed to be able to do without any application. From the beginning the week's lesson was divided into three sections:

a. Presentation of dialogue for memorization and self test on content.

b. Presentation of grammar with drills and testing.

c. Cultural unit.

The program began Fall Quarter, September 1968. When the students began to work with AID we saw and corrected several problems which were the result of having worked on a purely theoretical basis:

a. Mainline instruction was too long.

b. Branches were too long.

c. Not enough branches -- Not enough opportunity to test.

Generally, these disadvantages were offset for the student because of the novelty of the method. The above conclusions were the result of observation by the writers rather than complaints by the students.

The materials were adapted to AID from Modern Spanish. The dialogues were used as contained in the text. The grammar and method of presentation had to be modified for programming.

In November, about half-way through the quarter, we noticed that the students were in the habit of having a fixed number of choices for each item. For example the dialogue testing section always had four-part questions and the grammar section had three-part questions. Subsequent to this observation the number of choices was always varied.

The cultural unit was designed to present meaningful situations and observations in Spanish speaking countries; items of interest which would not normally be a dialogue topic:

a. Spanish songs,

b. gestures, and

c. transportation.

It was meant to be more difficult for the student -- challenging and interesting. In actual practice, the materials, as written, proved to be too difficult for the beginning students and they were unable to benefit as expected.

The second quarter procedure was similar, i.e. observation -- improvement except the cultural section was set aside to attempt to provide a visual program. Again there were unforeseen difficulties:

a. The material had to be gathered or drawn for photography.

b. Developing was time consuming.

c. Because of lack of staff, it was necessary to have the obligatory work done first, i.e. writing the programs.

Consequently we learned what was necessary to do to provide visuals but a program was not finished in time for the students during the Winter Quarter.

The greatest shot in the arm the writers got was learning to program. A personnel problem required the writers to learn how to program AID in order to have the programs done on time. It was only then that we really discovered what we could do with AID. Some of the innovations to the program during the Winter Quarter:

a. Use of true false questions.

b. More than one correct answer.

c. How to inter-connect branches.

Besides the amplification of the branching function, a consistent technical language was developed.

There was an immediate and favorable response on the part of the student. Each instruction frame was different and interesting and made them think. We also observed that the students began to work more on the learning function of AID rather than rely so heavily on the testing function.

The Spring Quarter brought several organizational changes which spread the work load more evenly. A total production schedule was made up. The cultural unit was written again on a realistic basis. Plenty of time was allowed for the completion of each division of program production. Visual programs were done on time and were very enthusiastically used by the students. The Spring Quarter brought a standardization of techniques and procedures and the programs were produced on schedule. Most of the changes were very minor. They consisted usually of working out ways to present a grammatical problem.

On Program Recording and Coding

The aim of the recording end of this project was to produce a set of tape lessons, including instructions, questions, and remedials, all programmed, coordinated, and ready for the student to use via the AID device. Two basic factors contributed to our choice of recording equipment, both of these related to the problem of how to best teach the student. The first factor considered how to best keep the student's interest, keeping distractions to a minimum. We decided that the way to do this would be to produce a program of professional quality, with no superfluous noises on tape which might distract the student, with quality reproduction of native speakers' voices as models for the student, and with realism, added interest, and relaxation periods included in the form of background effects, sound effects, and music.

The other factor affecting our choice of recording equipment was that we wished our lessons to have remedial capabilities. In order to best use the remedial tracks of the AID device, all questions, instructions, and remedial lesson segments had to be individually recorded and timed before being programmed onto AID. This meant that recording could not be done directly onto AID, but rather had to be done separately.

To produce the program, taking into account the basic influencing factors above, two Ampex professional tape recorders were used besides the basic AID device. The first of these machines was used for lineare recording of lessons later to be programmed onto AID. The second recorder was used for outside input of sound effects, background effects, and music.

A variety of additional inputs were used. For music, we used a Bogen turntable, with matching speakers, on loan from the UCI Language Laboratory. Microphones used were three top quality Shure Unidyne III dynamic unidirectional microphones for voice recording, plus one Electro-Voice dynamic omnidirectional microphone for sound effects, group voice, and miscellaneous recording.

To mix these inputs for proper recording, we used a professional mixer-amplifier, the Bogen MX60A. In addition to all these components, of course, we have all the necessary connections and switching capabilities to enable us to record from any outside source.

For programming the linearly-taped lesson segments onto the AID device for the finished lessons, the same Ampex recorder and Bogen amplifier were used. Because of technical peculiarities in the erasing technique required for AID's remedial tracks, it was necessary for us to use an audio-tone generator, which was borrowed from the UCI Physics Department. In addition to this, a separate speaker was required for monitoring the lessons as they were being programmed.

The AID device also controlled a Kodak Carousel Automatic-Focus slide projector. Since one of the people on the staff of the project during its early stages had a quality camera, it was not necessary for the project to purchase one; but we did purchase a Novaflex slide copier attachment and a variety of bellows, extenders, and other attachments.

As for recording supplies: for linear recording, 70 reels of 1/4" x 1800' professional recording tape; for the final, completed lessons on AID, 20 reels of 1/4" x 1200' professional low print recording tape; for

chapter by chapter storage of these lessons, 50 empty 5" reels.

Recording time for each lesson involved three to five people for approximately ten hours -- two to four voices and one recording technician. Programming for each lesson involved only one person, but fifteen to twenty hours time.

A Statistical Progress Report

The subjects for this experimental course were predominantly male. There were eighteen in the Spring Quarter, 1969, at the first meeting. Of the eighteen, sixteen remained in class during the first week; fifteen during the second week; and twelve continued up to the end of the quarter.

The students were distributed in three different levels as follows:

Table 1

COURSE OFFERED	REGIST. ERED	1° WEEK		2° WEEK		3° WEEK		CONTINUING	OBS
		IN CLASS	DROP OUTS	IN CLASS	DROP OUTS	IN CLASS	DROP OUTS		
K1A	6	6	-	6	-	5	1	5	
K1B	3	2	1	2	-	2	-	2	
K1C	9	8	1	7	1	5	2	5	
TOTALS	18	16	2	15	1	12	3	12	

Oral, reading, and written tests were given every week at all levels with the following results:

(See Table 2)

TABLE 2

TEST	WEEK	GRADES																				PERCENTAGE					OBS.
		A			TOTAL	B			TOTAL	C			TOTAL	D			TOTAL	F			TOTAL						
		KIA	KIB	KIC		KIA	KIB	KIC		KIA	KIB	KIC		KIA	KIB	KIC		KIA	KIB	KIC		A	B	C	D	F	
ORAL	1°	4	1	6	11	1	-	1	2	1	1	-	2	-	-	-	0	-	-	1	1	68.7	12.5	12.5	.0	6.3	
	2°	4	1	4	9	2	1	1	4	-	-	2	2	-	-	-	0	-	-	-	0	60.	26.6	13.4	.0	.0	
	3°	3	1	4	8	2	1	1	4	-	-	-	0	-	-	-	0	-	-	-	0	66.6	33.4	.0	.0	.0	
	4°	3	-	2	5	1	2	2	5	-	-	1	1	-	-	-	0	1	-	-	1	41.7	41.7	8.3	.0	8.3	
	5°	4	-	4	8	1	1	1	3	-	-	-	0	-	-	-	0	-	1	-	1	66.5	25.0	.0	.0	8.5	
	6°	4	1	4	9	1	1	1	3	-	-	-	0	-	-	-	0	-	-	-	0	75.	25.	.0	.0	.0	
TOTAL	6W	22	4	24	40	8	6	7	21	1	1	3	5	0	0	0	0	1	1	1	3						
WRITTEN	1°	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	.0	.0	.0	.0	.0	
	2°	4	-	3	7	2	2	1	5	-	-	1	1	-	-	-	0	-	-	2	2	46.7	33.4	6.6	.0	13.3	
	3°	4	2	2	8	1	-	2	3	-	-	1	1	-	-	-	0	-	-	-	0	66.7	25.	8.3	.0	.0	
	4°	3	2	4	9	2	-	1	3	-	-	-	0	-	-	-	0	-	-	-	0	75.	25.	.0	.0	.0	
	5°	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	-	-	-	0	.0	.0	.0	.0	.0	
	6°	4	-	1	5	1	2	4	7	-	-	-	0	-	-	-	0	-	-	-	0	41.6	58.4	.0	.0	.0	
TOTAL	4W	15	4	10	29	6	4	8	18	0	0	2	2	0	0	0	0	0	0	2	2						
READING	1°	-	2	4	6	-	-	1	1	-	-	-	0	-	-	-	0	-	-	2	2	-	-	-	-	-	
	2°	3	-	3	6	2	2	1	5	-	-	1	1	-	-	-	0	1	-	2	3	40.	33.3	6.7	.0	20.	
	3°	3	2	2	7	1	-	3	4	1	-	-	1	-	-	-	0	-	-	-	0	58.4	33.4	8.2	.0	.0	
	4°	3	-	3	6	2	2	2	6	-	-	-	0	-	-	-	0	-	-	-	0	50.	50.	.0	.0	.0	
	5°	2	1	4	7	3	1	1	5	-	-	-	0	-	-	-	0	-	-	-	0	58.4	41.6	.0	.0	.0	
	6°	5	1	4	10	-	1	-	1	-	-	1	1	-	-	-	0	-	-	-	0	83.4	8.3	8.3	.0	.0	
TOTAL	5W	16	6	20	42	8	6	8	22	1	0	2	3	0	0	0	0	1	-	4	5						

Budget

The budget for this project can be broken down roughly into six major categories. The first, is the group of Research Assistants (R.A.) who virtually served the University and the project in a dual capacity. That is, in maintaining the control sections and the experimental sections of the comparison groups they were actually functioning as full-time Teaching Assistants while writing much of the program for AID. It is mainly for this reason then that the budget for the RA's is the larget item of the six categories: $7,694.61.

Another item of considerable importance and budgetary weight concerns the recording staff. Here a combination of native voices and technical personnel were needed. Many hours of recording were necessary to keep up with the amount of work the students were able to master at the machine. This item of recording personnel came to $4,590.00.

A third large amount of funds for general assistance was taken up again by staff. This item was for technical RA's to handle all of the electronic problems of the complex programming and coding done on AID. This too took many more hours to accomplish than was originally considered. The total cost to the project for this category came to $2,210.46.

The last item of the four in the general assistance group is for clerical staff. Here we had a half-time secretary and additional typists for computer terminal programming and copying of the main line manuscript. The clerical staffing totaled to $2,743.00.

GENERAL ASSISTANCE TOTAL: $17,238.07

The final two items are supplies and expenses, totaling: $5,561.10

and Equipment and Facilities: 1,500.00

The Grand Total cost of the entire project therefore is: $24,239.17

Recording Staff	Technical Staff	Clerical Staff	R.A. Staff	Supplies and Expenses	Equipment and Facilities
4,590.00	2,210.48	2,743.00	7,694.61	5,561.00	1,500.00

$24,299.17

Supplement to: Final Report; Innovative Projects - Foreign Language Teaching
University of California, Irvine, June 1969.

Supplementary Project: Testing of Appleton-Century-Crofts - Center for Applied Linguistics French Program; directed by Howard Appel

Funds for this project were provided from "Supplies and Expenses" Item listed above. Expenditures were the following:

Rental of Equipment and Installation:	$2100.00
Communications:	122.00
Packing and Shipping:	347.00
Total:	$2569.00

The $4800.00 provided for this phase of the experimental teaching project was more than adequate; consequently, the remainder was used to support the parent AID project.

This project was undertaken at the University of California, Irvine, with the cooperation of the Center for Applied Linguistics. Under the direction of Howard Appel, we tested the "Introductory French Program for the Portable Laboratory System", developed at the Center for Applied Linguistics but not previously tested in an academic environment. The Center for Applied Linguistics loaned the material for the French Program: magnetic tapes, visual material, reference books. The New Century Division of Appleton-Century-Crofts rented the teaching devices and instruments necessary for presenting the material: student listening devices, tape

recorders, voice-operated microphone, student activated learning machine, electronic control unit.

The French Program was devised as a completely self-contained teaching-learning sequence comparable, in theory at least, to the ordinary academic introductory course in French. Special care was taken in the preparation of the Program to insure active student participation and response to every step of the sequence. Student responses were essentially of three kinds: 1) oral answer to voice-sensitive microphone, 2) judgment-type answers from oral or written cues, 3) multiple-choice matched answers or oral answers from visual cues. No provision was made for student writing. Every precaution was taken to avoid student error, learning steps were carefully planned, and the sequence was entirely intrinsic.

Several students were refused permission to take French Sla because of previous experience in French; school-, home-, or travel-backgrounds would have made it impossible to judge with any reliability what they were learning through Program. Of the seven students who were enrolled, one was unable to finish. Foreign language backgrounds of the other six ranged from excellent to extremely poor. All were native-speakers of English for whom French was the second foreign language studied. Two were studying French simply to fulfill school and departmental requirements; two others had already fulfilled requirements and were studying for definite personal reasons; and two had rather vague, ill-defined goals in mind.

Students met together as a group only once at the beginning of

the course and then met as a class only after they had finished the Program. At the initial meeting, they learned the operation of the equipment and the nature of the course. Each was then given an hour of individual explanation about the nature of language learning and programming. Although minimum requirements were set (five lessons per week), each student was free to use as much extra machine time as he felt necessary provided this did not interfere with another student's scheduled time. Students were free, but not forced, to consult the instructor at any time and free to take the frequent tests whenever they felt adequately prepared. Each test was administered individually and corrected immediately with explanations of errors. Students were monitored as they worked in the laboratory two or three times per week. Recommendations for improvement, explanations and encouragement were given at the time. All help was casual and informal and related to the Program.

At the end of the programmed instruction period, students met as a class for twenty hours of conversation practice and oral drill. These sessions supplemented material -- grammar structures, vocabulary -- presented in the Program. Not part of the Program itself, these supplementary classroom sessions were designed to meet two needs -- first to make the transition from programmed material to classroom language learning in the normal French sequence at UCI easier for the student; and second, to provide extra attention to areas where the Program proved inadequate for our normal academic needs.

Test results indicate that students mastered material presented in

the Program with comparative ease. Seven tests were administered in all. Results compare with those attained by students at Cornell University taking the same programmed course and those obtained at the Center for Applied Linguistics by non-academic test volunteers. Average test results for the six students completing the course were: 83.5, 86.2, 89.7, 90, 95.5, and 96.3%. Class average for all tests was 90.2%. The average attained by the Cornell students was 89% and indicate no difference from ours.

At the end of the classroom instruction period a local test was administered. This test was comparable, but not identical, to the test given as a final examination to ordinary French 1 classes. Students working on the Program compared with ordinary students in the areas of grammar-listening and hearing. They did significantly better in the manipulation of certain grammar structures. They proved weaker, however, in conversation and with a single exception, in generating sentences of their own. They were notably weak in writing.

Throughout the course we were plagued with machine unreliability. Breakdowns were numerous, and in some cases these caused several days' delay in student progress through the Program.

The Program proved successful in teaching the basic concepts of French structure and providing adequate drill on them. The Program does not, however, provide for adequate drill in reading and writing. These areas would have to be strengthened before the Program is, by itself, ready to take over the total teaching function, if indeed, it ever were to be ready.

At Irvine we assume that one of the skills acquired in learning French is the development of the capacity for language creation -- the capacity of the student to hear things that he has never before heard and to understand them correctly. We attempt to move the student away from his textbook as early as possible and force him to say French he has never heard. This is done by requiring a deep understanding of linguistic structure and forcing the student into a conversational mode where he can by analogy, in effect, create his own French -- create it automatically and with necessary grammaticality. With the exception of the two students with strong language backgrounds (one an advanced Spanish major, and the other with strong German), students in the Program failed to develop this kind of mastery in listening or speaking. The two who were successful in this area were also the most successful in other areas of their language development, and it must be assumed that their success depended to a significant degree on habits and skills learned outside the Program.

We conclude that the Program as it now stands cannot be used to replace the normal language classroom. We believe it, however, to be better than any programmed course currently available commercially, requiring less time on the part of the student to complete and requiring more active student response at all times. As a result of this year's testing program, many changes are being made in the technical presentation of the program. Appleton-Century-Crofts has simplified the teaching device and is working toward more reliability and simplicity in the machinery.

At the present time we believe the Program itself is effective and successful. We do not, however, believe it should be used exclusively. As it now exists, it is an extremely effective presentation of text and laboratory materials and could be used with excellent results were it to accompany classroom presentations, tutoring sessions, or group study sessions that would develop the creative listening and conversation skills.

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